

## Lesson 1: Procedures Used in Processing Food

The food processing industry has made an impact on people's lives. It is nearly impossible to eat a meal containing a food that has not been processed. Consumer buying habits help determine what food products will be processed and marketed. Can you name the processed food(s) that were a part of your last meal? What processing techniques helped transfer this food from the farm product to you?

### Why Are Foods Processed?

Food processing can be defined as any mechanical, chemical, or biological treatment to food. These processes may preserve the food or change the raw material's appearance or flavor. Food is processed for many reasons. Many processed foods can be stored for longer periods of time than raw food products. Natural deterioration along with microbial growth and activity are slowed due to food processing.

Another reason for processing food is to control a food's composition. If a food product, (e.g., oatmeal) is to have a standard protein, fat, and moisture content, it must be processed. Other reasons for food processing are for convenience, variety, flavor enhancement, and value adding. Producers grow potatoes, not potato chips. Farmers harvest wheat, not flour. Most American consumers prefer to buy frozen cut up chicken pieces, not a live bird. Without flavor enhancement, most ice cream flavors would not exist. Value adding refers to techniques used to increase the economic return or worth of food.

### How Can Foods Be Processed?

Foods may be processed in many different ways. The method used depends on the raw product, its destination, consumer demand, health, and safety.

Dehydration - In dehydration, the moisture is removed from a food. Dried fruit, raisins for example, and jerky are common dehydrated, processed foods.

Fermentation - Fermentation uses selected microorganisms to break down carbohydrates which releases nutrients located in plant cells. Starch in plant cells can be broken down into simple sugars. Other nutrients can be released during this process. Fermentation processes produce pickles, sauerkraut, vanilla, salami, sour cream, yogurt, cottage cheese, cocoa, beer, wine, soy sauce, and bread, just to name a few.

Milling - Milling involves the washing of grain and the removal of chaff, foreign seeds, and soil. Grains may also be separated by size using a series of sieves.

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Fractionation - Fractionation is the process of separating the hulls, germ, bran, and endosperm. Particle size and density are physical properties on which separation methods depend.

Grinding - Grinding usually follows milling and fractionation. Here the particle size of grains are reduced to that of flour or meal using rollers to crush the larger particles. Wholesale cuts of meat are ground into ground beef, ground pork, etc. The term comminution refers to grinding meat.

Emulsifying - Certain food products contain both water and oils or fats. Naturally, these two constituents repel each other and separate. Emulsifiers are materials that keep this separation from occurring. For example mayonnaise contains lecithin (a phospholipid of the egg yolk) which keeps mayonnaise from separating into layers of water and oil. Margarine, salad dressing, sausage products, and ice cream are processed with emulsifiers.

Homogenizing - Homogenizing food refers to a process of forcing the food through a small valve under high pressure to reduce the size of the globules of fat. When the large globules are reduced to a small size, the food's consistency remains constant. Milk is homogenized to keep the milk fat in suspension.

Hydrogenation - This is the process of converting vegetable oil (a liquid) to a solid shortening or spread. By chemical means, hydrogen is added to an oil and the hydrogen saturates the oil's fatty acids. The newly formed product is spreadable and resists rancidity better than the oil. Margarine is an example.

Combination - Combination is mixing constituents together. Enriching bread with vitamins is an example of a combination process. Adding chocolate to milk is another example of mixing, or combining ingredients.

Texturization - Texturization refers to processes that change the shape or color of a food. Durum wheat is processed, or texturized, into macaroni or spaghetti. Meat may be flaked, ground, or chopped and then reformed into a steak or roast-like product. These are called restructured meats.

Chemical Modification - The addition of heat, enzymes, or microbes is a process called chemical modification. Popcorn in its popped state, corn syrup, and pickles are examples.

Precipitating/Centrifuging - To precipitate means to separate a solid from a solution. Centrifuging is a quick means of separating constituents with different densities. Separating cream from milk is a common example of separation based on densities. Wet corn milling involves a procedure in which the germ floats in the settling trough

and is skimmed off. The starch, protein, and hulls are then screened to remove the hulls. The starch and protein solution is then centrifuged and the denser starch particles are thus separated.

Extrusion - Extrusion is a process where a formulated dough or mash is forced through an extruder under high pressure. High pressure causes the starch molecules to swell and then gel. The steam generated by the heat of the process causes a puffing of the product which forms a new shape. Breakfast cereals are commonly extruded.

### **Food Safety Assured**

Food safety depends on a number of factors and the activities of many people. Both the federal and state governments are responsible for food safety until the consumer purchases the food. An estimated \$1 billion is spent annually by 12 federal agencies to ensure food safety and quality inspection. Private and state agencies spend more than \$5 billion annually.

The Federal Meat Inspection Act of 1906 still provides mandatory inspection of animals, slaughtering conditions, and meat processing facilities. It regulates interstate meat sales.

In 1967, the Wholesome Meat Act was passed. It requires all state and city meat regulations to meet federal standards. The Federal Poultry Products Inspection Act of 1957 and the Wholesome Poultry Products Act of 1968 set federal standards on poultry.

The public is protected against false advertising in the food industry due to the Federal Trade Commission Act of 1938. The Food, Drug, and Cosmetic Act of 1938 set the basic principles of food safety and gave the FDA the power to enforce food safety measures. Infant formulas must contain the known essential nutrients at the appropriate levels according to the Infant Formula Act of 1980. Federal Grade Standards maintain uniform quality standards. State and Local laws are usually administered by the Health Department.

The Food and Drug Administration (FDA) assures consumers that the food they buy is safe, nutritious, and honestly represented. All additives must be approved by the FDA before use. The FDA also has a Generally Recognized As Safe (GRAS) list of over 600 ingredients (e.g., sugar, table salt, cinnamon) that are not considered additives. It is the USDA's job to monitor for safety and quality all meat and poultry. The FDA monitors all other processed foods. The Grade A Pasteurized Milk Ordinance established minimum quality standards for Grade A milk.

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America's food is arguably the world's safest and most wholesome. Yet several million people suffer from food-related illnesses each year. A large number of these illnesses (70-80 percent) can be prevented by proper food handling at home and in restaurants.

### Cleaning and Sanitization

Most equipment in food processing plants is constructed of stainless steel. Not only is stainless steel durable, but it can be easily cleaned and sanitized. Cleaning refers to removing all visible filth. Sanitizing means destroying any microbial contaminants. Food contact surfaces are usually rinsed with tap water to remove most of the food residue before cleaning starts. An alkaline cleaner in hot water is the normal cleaning solution. Its strength and temperature depend on the type of soil to be removed and whether washing is by hand or by mechanical circulation. This step is often followed by washing with an acidic solution thus dissolving residues of minerals. Following cleaning, sanitizing is performed with 180°F water or an approved chlorine or iodine rinse. Metal equipment, other than stainless steel, may need an edible mineral oil coating to prevent it from oxidizing (rusting).

### Summary

Food processing is an important part of the food industry. Any mechanical, chemical, or enzymatic treatment to food which alters its original form is called food processing. Length of storage, slower deterioration, anti-microbial contamination, convenience, composition control, and flavor are some of the reasons for processing.

### Credits

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